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SPECIFICATIONS FOR PREFABRICATED METAL BUILDINGS (VERTICAL WALLS)

01 SCOPE: This section covers prefabricated metal buildings, complete.

02 APPLICABLE PUBLICATIONS: The following publications of the issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

a. Federal Specifications:

DD-G-451a & Am-1	Glass, Flat and Corrugated, for Glazing, Mirrors, and other uses
FF-H-106a & Am-1 & Int. Am-9	Hardware, Builder's; Locks and Door-Trim
FF-H-00111b (GSA-FSS)	Hardware, Builder's; Shelf and Miscellaneous
FF-H-116c & Am-4	Hinges, Hardware, Builder's
FF-H-121	Hardware, Builder's; Door-Closing Devices
HH-I-562 & Int. Am-2	Insulation, Thermal, Mineral Wool, Block or Board and Pipe Insulation (Molded Type)
QQ-S-698 & Am-1	Steel, Sheet and Strip, Low-Carbon
QQ-S-741a & Am-1	Steel Plates, Shapes and Bars, Carbon, Structure
TT-G-00410c (GSA-FSS)	Glazing Compound, Sash (Metal) for Back Bedding & Face Glazing. (Not for Channel or Stop Glazing)
TT-P-86c & Am-4	Paint: Red-Lead-Base, Ready-Mixed

TT-P-615b	Primer Coating: Basic Lead Silicon Chromate, Ready-Mixed
TT-P-636b	Primer Coating, Synthetic Wood and Ferrous Metal
TT-P-645	Primer, Paint, Zinc-Chromate, Alkyd Type

b. Military Specifications:

MIL-S-4174A	Steel Sheet & Strip, Flat, Aluminum Coated, Low Carbon
MIL-C-490A & Am-1	Cleaning & Preparation of Ferrous and Zinc Coated Surfaces for Organic Protective Coating
MIL-P-6883	Paint, Blended-Type, Coal-Tar-Pitch Base, Bituminous
MIL-C-18969B	Calking Compounds, Metal Seam and Wood Seam

c. American Concrete Institute Publication:

ACI 318-63	Building Code Requirements for Reinforced Concrete

d. American Iron and Steel Institute Publication:

Light Gage Cold-Formed Steel Design Manual (1962 Edition and Commentary)

e. American Society for Testing & Materials Standards:

A 93-63T	Zinc-Coated (Galvanized) Iron or Steel Sheets, Coils, and Cut Lengths
E 96-63T	Water Vapor Transmission of Materials in Sheet Form

f. Architectural Aluminum Manufacturers Ass. Publication:

Aluminum Windows Specifications (January 1964)

g. Metal Building Manufacturers Association Publication:

Recommended Design Practices Manual (1963 Edition)

h. National Fire Protection Association Publication:

NFPA No. 220 Standard Types of Building Construction (May 1961)

i. Steel Window Institute Publication:

Recommended Standards for Steel Windows, 1964

03 SHOP DRAWINGS and/or erection drawings and instruction manuals showing complete erection layouts, details, installation instructions, and foundation details shall be submitted for approval in accordance with SPECIAL CONDITIONS. Materials shall not be delivered to the site before the approved shop drawings have been returned to the contractor. Details and layouts shall show the structural framing and the location, lengths, and markings of panels and other component parts to correspond with the sequence and procedure to be followed when installing and fastening the panels and component parts. The contractor shall be responsible for all errors of detailing and fabrication and for the correct fitting of parts and accessories shown on the shop drawings.

04 GENERAL REQUIREMENTS:

a. Types: The prefabricated metal buildings shall be single-unit, rigid frame type, as shown, of the quantity and sizes listed below:

1 each	Transmitter Building	40 x 72 x 14
1 each	Power Plant Building	24 x 36 x 10

b. Gages specified for steel are U.S. Standard

c. Assembly: The size of the prefabricated components and the necessary field connections and fastenings required for erection shall be such as will permit easy assembly by means of standard construction equipment and tools without the use of special apparatus or appliances. Only standard size and type bolts, nuts, screws, washers, and other fastenings shall be necessary for field erection except as specified otherwise hereinafter. No fastenings shall be removable from the outside after building is erected. Each piece and part of the assembly shall be clearly and legibly marked to correspond with previously prepared erection drawings, diagrams, and/or instruction manuals. At least three complete sets of foundation drawings, erection drawings, diagrams, or instruction manuals, including anchorbolt plans, shall be provided for each building.

d. Packing for Shipment: Prefabricated components, sheets, panels, and other manufactured items shall be packed for overseas shipment in such a manner as to prevent damage by moisture or handling.

05 DESIGN REQUIREMENTS: Unless specified otherwise herein, the design of prefabricated metal buildings shall be in conformance with the Recommended Design Practices Manual published by the Metal Building Manufacturers Association. The contractor shall submit for approval the engineering design calculations and stress diagrams of structural or load-bearing components of the buildings and foundations.

a. Normal Design Loads: The vertical live loads, in addition to the applicable dead loads, shall be not less than 30 pounds per square foot, applied on the horizontal projection of the roof structure. The wind load on the buildings shall be 15 pounds per square foot proportioned and applied as horizontal and uplift velocity pressures, in conformance with the MBMA Recommended Design Practices Manual. Combinations of all above factors should be considered.

b. Auxiliary Loads: Superimposed dynamic and/or static loads such as suspended ceiling and future duct work shall be applied in addition to the normal design loads and shall be considered in combinations with normal design loads in conformance with the MBMA Recommended Design Practices Manual.

c. Design of Foundations will be by others. Foundation bolt templates will be furnished by Building Manufacturer for each structure.

06 STEEL FRAMEWORK: Connections shall be riveted, welded, or bolted, as standard with the manufacturer. Bolted connections shall be made with unfinished, turned, ribber, or high-tensile-steel bolts as appropriate for each connection. Types of bolts and their use shall be shown on shop or erection drawings. Cold-formed steel less than 3/16 inch thick shall be designed in conformance with the American Iron and Steel Institute publication Light Gage Cold-Formed Steel Design Manual. Prefabricated sections of the framework shall be designed to assure easy packing, shipping, erection, and assembly in a manner that will assure maximum strength and rigidity. Structural members or structural assemblies having cross-sectional areas and/or connections that differ from the section and connections shown may be used, subject to approval and provided that the structural properties of the proposed framework are equal to or greater than the structural properties of the framework shown. The contractor shall submit drawings or diagrams showing details of the proposed prefabricated system.

a. Erection: Erection in the field will be by others.

b. Rigid Frame or Column Bases or Sill Members anchor bolts shall be unpainted black steel furnished by the Building Manufacturer for each structure. Any such items required to be embedded in concrete will be supplied in sufficient time to meet foundation schedule to be performed by others.

07 PANELS FOR WALL CONSTRUCTION: Panels shall be applied with the ribs and other configurations in a vertical position. Panels shall be supplied in the single lengths from base to eave on walls up to 30 feet in height with no horizontal joints except at the junction of door units, window units, louver panels, and similar openings, at gable end-wall splices or rake splices, and where a wall splice is needed for the flashing of attached structures. The maximum windload deflection in siding and panels shall not exceed 1/180th of the span. Endlaps for panels shall be not less than 4 inches. Walls shall be closed at the base and eave, and around windows, doors, framed louvers, and other similar openings by flashings and/or formed closures to assure adequate weather-tightness. Flashing or stops will not be required where weather-closed or approved self-flashing panels or siding are used. Siding panels shall be steel.

a. Steel Panels shall be zinc coated. Zinc-coated sheets shall conform to ASTM Specifications A 93. The weight of zinc coating for all gages shall be 1.25 ounces per square foot. Panels shall have either interlocking ribs or configurations and shall be formed from steel of not less than 18 gage. Panels having interlocking ribs shall not be greater than 16 inches wide, with interlocking ribs not less than 3 inches deep. The interlocking ribs of adjoining panels shall be fastened together at the base and top of the panels and at each girt by means of positive bolt and nut fasteners of a type standard with the metal-building manufacturer. Configurated panels shall have configurations not less than 1-1/2 inches deep, spaced not to exceed 12 inches on centers, or not less than 3/4 inch deep, spaced not to exceed 6 inches on centers. Sidelaps shall be interlocked or lapped one configuration.

b. Insulated wall panels shall be approved factory or field-assembled units and shall have a nominal coverage width of not less than 12 inches. The panels shall consist of a central insulating core with metal interior and exterior face sheets securely fastened together with rivets, bolts, studs, snap-on fasteners, or other method of fastening that is recommended by the manufacturer, including interlocking

with basic wall units. The metal faces shall be steel, and shall be uniformly separated by studs, bars, interlocking ribs, or other approved means. Steel face sheets shall be zinc-coated steel conforming to ASTM Specification A 93, with weight of zinc coating for all gages 1.25 ounces per square foot. The exterior and interior face sheets shall be steel. The minimum gage for steel shall be 26. The panels shall be constructed in a manner that will eliminate condensation on the interior side of the panels. Joints between panels shall be sealed with an approved joint-sealant material as specified hereinafter. The U-factor of the assembled panels shall not exceed .25. The cores of the panels shall be insulation standard with the panel manufacturer. Insulation shall be durable and shall retain the U-value specified for the panels for the life of the metal sheets used in fabricating the panels. In addition, the insulation shall meet the following requirements:

(1) Insulation material shall be compatible with adjoining materials.

(2) Insulation material shall be nonrunning and nonsettling. Uninsulated areas shall not be left in panels subjected to vibration.

(3) Insulation material shall be unaffected by extremes of temperature and humidity and prolonged periods of combination thereof.

(4) Insulation material shall be noncombustible as defined by the National Fire Protection Association Standard No. 220.

(5) Insulation material shall not furnish food for nor harbor insects.

(6) Insulation material shall be odorless and shall not promote growth of mold. The panels shall be fastened to adjoining panels and to structural framework by a method recommended by the panel manufacturer and approved before the work is started. Fastening means will be tamper proof from the exterior of the building.

08 PANELS FOR ROOF CONSTRUCTION: Roofing panels shall be applied corrugations in the direction of the roof slope. The maximum liveload deflection in roofing panels shall not exceed 1/180th of the span. Sidelaps shall be laid away from the prevailing winds, and sidelaps and endlaps of roofs shall be sealed with roof joint sealant. The roof shall be

flashed and/or calked at the ridge, at eaves and rakes, at projections through the roof, and elsewhere as necessary to make the roof weathertight. The flashing and/or calking shall be accomplished in a manner that will assure complete weathertightness and the method to be used shall be subject to approval. Minimum endlaps for roofing and ridge caps for pre-engineered and factory-punched laps shall be 6 inches; other minimum endlaps shall be as follows:

6 inches for roof slopes not less than 4 in 12

7½ inches for roof slopes not less than 3 in 12

Panel type roofs shall have slopes not less than 3 in 12. Roofing panels shall be steel.

a. Steel Roofing Panels shall be zinc coated. Zinc coated steel shall conform to the requirements of ASTM Specification A 93. The weight of zinc coating for all gages shall be 1.25 ounces per square foot. The roofing shall be the panel type, having either interlocking ribs or configurations and shall be formed from steel of not less than 26 gage. Panels having interlocking ribs shall be no greater than 16 inches wide, with the ribs not less than 3 inches deep. The interlocking ribs shall be upstanding, and self-tapping screws shall be used to secure the panels to roof supports. Screws will be tamper proof from outside. Configurated panels shall have configurations not less than 1½ inches deep, spaced not to exceed 12 inches on centers or not less than 3/4 inch deep, spaced not to exceed 6 inches on centers. Sidelaps shall be not less than one configuration.

09 FASTENERS:

a. Fasteners for Securing Siding & Roofing Panels:

The installation of the fasteners shall be in accordance with the manufacturer's recommendation. Unless specified otherwise herein, the fasteners shall be either self-tapping screws, end-welded studs, bolted or riveted studs, or step rivets held by aluminum straps. Other types of fasteners standard with the building manufacturer may be provided if prior approval has been obtained. At the eave line, fasteners for securing panels to structural framing shall not exceed 6 inches on centers. For roof slopes of 4 in 12 and steeper, sidelap fasteners shall not exceed 16 inches on centers for the first three spaces up the roof slope from the eave and shall not exceed 60 inches on centers from this point to the ridge. Endlaps shall occur at

structural members only and shall be fastened through structural members, not to exceed 6 inches on centers; configurations and corrugations in the zone of the 6-inch endlap shall be fastened with a minimum of two fasteners per configuration or corrugation. Fasteners for securing panels to structural framing at other than eaves and endlaps shall be spaced not more than 12 inches on centers. For roof slopes flatter than 4 in 12, where only the deep configuration or the interlocking rib panels are acceptable, the sidelap fasteners shall not exceed 15 inches on centers for the first three spaces from the eave line and shall not exceed 30 inches on centers from this point to the ridge. Endlaps shall occur at structural members only and shall be fastened to structural members with not less than three fasteners per lineal foot; configurations in the zone of the 6-inch endlap shall be fastened with a minimum of two fasteners per configuration. The fasteners shall meet the following requirements:

(1) Self-tapping screws shall be cadmium plated or corrosion-resisting steel. The screws shall be No. 14, type B, with recessed hex heads and shall be provided with composite metal and polymerized chloroprene washers. The washers shall be dished or cupped to assure a tight seal and shall have a minimum outside diameter of 5/8 inch. The metal portion of the washers shall be not less than 0.04 inch thick and the polymerized chloroprene portion shall be not less than 0.0625 inch thick. The metal portion of the washers shall be a material that is compatible with the roofing or siding being applied.

(2) End-welded studs shall be either the capped or the flattened-head type. The capped type shall consist of a one-piece corrosion-resisting steel stud or a cadmium-plated steel stud, having a 5/16 inch-diameter base and a 3/16 inch serrated shank. After the metal sheets are laid over the studs and impaled with a rubber hammer, an aluminum cap shall be driven onto the serrated shank to form a weathertight seal. The flattened-head type shall be a composite stud consisting of an aluminum shank with a corrosion-resisting base. After the metal sheets are laid over the studs and impaled with a rubber hammer, a polymerized chloroprene washer and an aluminum collar shall be applied and the head of the shank shall be flattened to form a weather-tight seal.

(3) Bolted or riveted studs: Cadmium-plated or corrosion-resisting-steel studs shall be bolted or riveted to the structural steel supports. The studs shall consist of a base not less than 5/16 inch in diameter. After the metal sheets are laid over the studs and impaled with a rubber

hammer, drive caps or screw caps shall be applied to the shank in a manner that will form a weathertight seal. Caps used with roofing or siding shall be of a compatible material.

(4) Step rivets shall be fastened to supports by means of preformed aluminum straps. The strap shall fit over the base of the rivet and shall be fastened to the supports by bending the ends of the strap around the edges of the supports. After the metal sheets are laid over the studs and impaled with a rubber hammer, a polymerized chloroprene washer and an aluminum collar shall be applied and the head of the rivet shall be flattened to form a weathertight seal.

b. Fasteners for interlocking panel siding shall be positive bolt-and-nut fasteners as approved and of size and type recommended by the siding manufacturer. Fasteners shall be installed in accordance with the siding manufacturer's instruction.

c. Fasteners for securing sidelaps, endlaps, and flashings shall be type A sheet metal screws, and shall be cadmium-plated, corrosion-resisting, or zinc coated for use with steel roofing and siding. The screws shall be equipped with composite metal and polymerized chloroprene washers, and shall be installed in accordance with the manufacturer's recommendation. Other types of fasteners standard with the building manufacturer may be provided subject to approval.

10 DISSIMILAR MATERIALS: Incompatible metal surfaces shall be kept from direct contact by one of the following methods:

a. Painting the incompatible metal with a coating of heavy-bodied bituminous paint conforming to Military Specification MIL-P-6883.

b. Painting the incompatible metal with a prime coat of zinc-chromate primer conforming to Federal Specification TT-P-645 followed by one or two coats of other suitable protective coating excluding those containing lead pigmentation.

c. An approved nonabsorptive gasket.

d. An approved calking placed between the incompatible metals.

11 METAL DOORS: Steel doors and pressed-steel frames shall be given a phosphoric acid treatment and one coat of an approved rust-inhibitive primer of a type standard with the manufacturer. Finish will be applied as specified under PAINTING section.

a. Steel doors shall be heavy duty doors as shown or specified. Industrial steel doors for heavy duty shall have stiles, rails, and panels made of steel weighing not less than 2.5 pounds per square foot (16 gage) and shall not be less than 1-3/4 inches thick. Doors shall be flush type. Astragals shall be provided on the active leaf of pairs of doors. The metal doors shall be reinforced properly for the application of hardware, and shall be drilled and tapped according to templates. The completed doors shall be free from twist, warp, and distortion, and shall fit the frames with a minimum amount of clearance even though subjected to windloads of 15 pounds per square foot. Stiles and rails shall be formed of seamless drawn steel tubing, of steel plates welded together, or of pressed steel plates welded together. Bottom rails, if required, shall not be less than 4½ inches wide. The doors shall have smooth finished surfaces, and corners and edges shall be rounded slightly. The edges of lock stiles of the doors shall be beveled 1/8 inch in 2 inches. Metal drip moldings shall be provided at the bottom of out-swinging doors in exterior walls except where weather-stripped thresholds shall be provided.

b. Frames for Hinged Doors: Frames shall be formed from low-carbon sheet or strip steel conforming to Federal Specification QQ-S-698 and before forming shall weigh not less than 2.50 pounds per square foot (16 gage) for heavy duty doors. The frames shall be of a type standard with the building manufacturer and shall be constructed to be coupled or interlocked in an approved manner with adjoining wall-covering material. The edges of the wall-covering material at the sides of the frames shall be reinforced as necessary to form a connection of strength and rigidity that adequately meets design criteria including windloads up to 40 pounds per square foot. Lintels above doorframes shall be contoured to serve as combination framing and flashing. Doors and frames may be shipped as a part of an assembled section or may be assembled at the site. Cross-sectional samples or drawings showing cross-sectional details of the proposed door frames shall be submitted. Approved structural steel frames may be provided in lieu of pressed-steel frames if such construction is standard with the building manufacturer.

c. Hardware for Hinged Metal Doors: Hardware necessary for the complete finish of the hinged metal doors shall be provided and shall conform to Federal Specification FF-H-106, FF-H-111, FF-H-116, and FF-H-121, except as specified otherwise herein.

(1) Butt Hinges shall be full surface, type T2155 with channel frame and half surface, type T2139 with pressed-steel frame. Hinges for doors requiring wide throw shall be swing-clear, type T2161, half mortise and type T2164, full surface. Three hinges shall be provided for each leaf of exterior and interior doors. Hinge pins and other exposed fastenings shall be the one-way type or other tamper proof type.

(2) Locksets for hinged metal doors shall be series 86 with optional series 161 and series 140.

(3) Door Stops of a type for securing to floors or walls, to suit the condition, and similar to types 1320E and 1328E, shall be provided at locations where door knobs will be in contact with the finished walls; lead shields or expansion shields shall be provided for setting in concrete construction.

(4) Chain Bolts, types 1021A and 1021B, size 6 inches, with top and bottom strikes, shall be provided for the inactive leaf of double doors.

(5) Finishes: Hinges shall be of steel with USP finish. Except where specified otherwise, other hardware shall be solid or bronze, cast or wrought as required, and shall have US4, US10, US26, or US26D finish, as standard with the building manufacturer.

(6) Metal Thresholds shall be provided for all exterior doors. Design shall preclude moisture, dust, and cold air entrance.

d. Sheet-Metal Overhead Doors shall be of a type standard with the building manufacturer. The doors shall be of the sizes shown on the plans, spring counter balanced for manual operation. To be made of not less than 16 gage, formed metal panel sections to produce a door not less than 2 inch nominal thickness with a flush outside face. The steel shall be galvanized with not less than 1.25 ounces of zinc per square foot and chemically treated for paint adherence. Meeting rails shall have rabbeted type weather joints. Bottom section of all doors shall have neoprene weatherstrip. Top section of all doors shall have adjustable seal strip. Doors shall be

equipped with galvanized lift cables, hall bearing rollers, and tumbler lock on two point locking device. Doors shall be capable of remaining in any position from full open to full close as desired.

e. Hardware for Overhead Doors: Hardware necessary for the complete installation of overhead doors shall be provided, including zinc coated steel tracks, brackets, and end stops. Hardware items shall be approved types standard with the door manufacturers.

12 SHEET-METAL ACCESSORIES: Zinc coated steel accessories shall be provided with zinc coated siding, roofing, and panels.

a. Ridge Caps, Eave & Edge Strips, Fascia Strips, miscellaneous flashings, and other sheet metal accessories, shall be formed from the same material as, and of gage not lighter than is used for the roof covering. Wall plates, base angles or base channels, and other miscellaneous framing members shall be either standard structural steel shapes or formed from steel weighing not less than 4.375 pounds per square foot (12 gage) before forming.

b. Gutters and Downspouts: Zinc coated steel gutters and downspouts shall be formed of 24 gage steel conforming to ASTM Specification A 93. The weight of zinc coating for all gages shall be 1.25 ounces per square foot.

c. Framed Air-Intake and Exhaust Louvers, non-mechanical type: Zinc coated steel louvers shall be made of 16 gage steel conforming to ASTM Specification A 93. The weight of zinc coating for all gages shall be 1.25 ounces per square foot. Suitable insect screens shall be provided.

13 MISCELLANEOUS ACCESSORIES:

a. Closure Strips shall be formed of compressed or synthetic rubber, closed cell polyvinyl chloride, bituminous impregnated materials, or metal of the same respective types as the roofing and siding, as standard with the manufacturer and as approved. Molded closure strips shall be free of open voids and shall not absorb or retain water. Closure strips shall be formed to match the corrugations or configurations of the roofing or siding being used, and shall be provided where shown or specified and wherever necessary to provide weathertight construction.

b. Roof Joint Sealant: The material and application of joint sealant shall conform to the following: Joint sealant material of the type specified shall be provided to make weathertight sidelaps and endlaps in metal roofing. Sidelaps and endlaps shall be sealed with a bead of type II, class B, ribbon-form sealant with performance characteristics conforming to or exceeding the requirements in Military Specification MIL-C-18969. Sidelaps for a distance of not less than 9 feet up the roof slope from the eave line shall be given a second bead of the same sealant. The material shall be applied in accordance with the manufacturer's printed instructions. Sealing material shall be used also for sealing joints in and around sealing strips at ridges, eaves, and valleys; at the bottom course in siding on vertical surfaces; for dabbing bolt holes before inserting fasteners; for flashings and corner boards; and elsewhere as necessary to provide watertight construction.

c. Wall Joint Sealant shall be a polyisobutylene-based, pressure sensitive tape or bead that will seal the joint from water and will be weather resistant when applied between two clean, dry surfaces under conditions of pressure that will be encountered in the use specified. The sealant shall withstand temperatures from -30 degrees F to 200 deg. F without loss of adhesion and without slipping, shall have properties allowing the compound to move with the expansion and contraction of the structure, and shall contain a cloth or fiber insert. Sealant shall be supplied in rolls with a removable paper or cloth backing.

14 SHOP PAINTING: Ferrous surfaces not specified hereinbefore to be coated shall be solvent-cleaned to remove oil and grease, then mechanically cleaned by power wire brushing or blast-cleaning to remove loose rust, loose mill scale, and other foreign substances. Minor amounts of residual rust that cannot be removed except by thorough blast-cleaning and tight mill scale that cannot be removed by applying a sharp knife to any edge will be permitted. After cleaning, one coat of paint conforming to Federal Specification TT-P-86, type I or II, or Federal Specification TT-P-615, type I or II, shall be applied. At the discretion of the Contracting Officer, the manufacturer's standard system of preparation and painting may be accepted, provided tests by an independent laboratory have proved that such system has performance characteristics at least equal to those of the system specified herein. Shop-coated metal shall be protected from corrosion before and after installation by treating corroded areas immediately upon detection. Abraded or corroded spots on shop-coated surfaces shall be wire-brushed and touched up with the same material as the shop coat. Surfaces that will be in contact with roofing or siding shall be given an additional field coat of the same used for the shop coat.

15 PAINTING:

a. Primer or pretreatment coat will consist of one of the following:

(1) A phosphoric acid activated primer that simultaneously phosphates the metal and deposits a primer film bonded to both faces, minimum dry film thickness of 0.25 mil.

(2) A crystalline phosphate base coating for use as a preparation for painting zinc coated steel or aluminum surfaces.

b. Finish coat will consist of thermosetting synthetic resin base coating that has been suitably plasticized, stabilized against both heat and light, and pigmented to obtain optimum performance. Minimum dry-film thickness will be 1 mil plus or minus 0.2 mil. Colors will be selected from manufacturer's standard colors.

16 SAMPLES: At the direction of the Contracting Officer, Building Manufacturer may be required to furnish samples or representative sections of building materials, accessories, fastening devices, hardware, etc., including those related to partition or ceiling.

17 SUSPENDED CEILINGS: Unless otherwise indicated or specified, the suspension system shall consist of 1½ inch funner channels and 3/4 inch furring channels, suspended by hanger wires or strap.

a. Hangers shall be spaced not more than 48 inches in one direction and 32 inches in the other direction unless otherwise indicated or approved. Hangers at ends of runner channels shall be not more than 8 inches from the wall. Hanger wires shall be saddle-tied to structural members. Flat iron or steel hangers shall be bolted with structural system.

b. Runner channels shall be spaced not more than 42 inches on centers unless otherwise indicated or specified. Each hanger wire shall be saddle-tied with tie wire to the runner channels and secured by at least three turns around the hanger wire. Runner channels shall be located within 6 inches of parallel walls and shall be cut short of abutting walls 1/2 inch plus or minus 1/4 inch.

c. Hangers, Tie Wire, and Clips:

(1) Hangers supporting runner channels shall be soft steel wire not less than 0.1620 inch nominal diameter (8 gage), conforming to Federal Specification QQ-W-461, steel number 1010, class Z, zinc coating. Flat iron or steel straps, 3/32 by 7/8 inch size, coated with zinc, cadmium, or rust-inhibiting paint may be substituted for the wire hangers.

(2) Tie wire and clips, rings, or other fastenings used in lieu of tie wire shall be of corrosion-resisting steel, conforming to Federal Specification QQ-W-423, composition 302, 304, or 316, condition A, or nickel-copper alloy conforming to Federal Specification QQ-N-281, class A or B, annealed condition.

18 ACOUSTICAL UNITS, PREFABRICATED:

a. General: Acoustical units of the types hereinafter specified shall be installed in rooms and spaces where indicated, generally in all spaces having finished ceiling. Shop drawings of the acoustical installations shall be submitted for approval. Suspension system shall be provided for until furnished.

b. Materials: Acoustical units installed shall conform to Federal Specification SS-A-118, type II B, random perforation pattern. Size and color shall be manufacturer's standard 24 x 48 off-white.

c. Erection:

(1) General: Building will be closed in and dry before acoustical units are installed. The furring channels or other basic suspension members shall be adequately leveled before application of the suspension system and acoustic material is begun.

(2) Ceilings: Acoustical units for ceilings and other overhead areas shall be secured by mechanical fastenings unexposed in the finished work. Suspension shall be accomplished by an approved standard mechanical suspension system having its members locked together to prevent slippage and providing a positive continuous support along at least two edges of each acoustical unit, as recommended by the manufacturer of the acoustical units used. Mechanical suspension system shall be leveled and so installed as to permit lateral movement due to expansion without restraint by abutted or parallel walls and partitions. Units shall be laid out in symmetry about the centerlines of each room, space or panel

unless otherwise indicated. Along the perimeter of the units for each room, space, or panel, metal edge moldings or channels shall be provided unless otherwise indicated. Exposed-to-view surfaces of metal-suspension-system members and edge moldings shall be painted or finished in a color to match the color of adjacent acoustical units.

19 PARTITIONS, MOVABLE:

a. Scope: This section covers movable partitions, complete.

b. General: Movable partitions shall be standard product of a manufacturer regularly engaged in the production of this type of equipment. Partitions shall be designed for erection on finished floor and shall be furnished in manufacturer's standard size units. Panel units shall be interchangeable with glazed or door units of similar size, styles, and manufacture. The design of partition units shall permit extension in any direction without removing adjacent units or material above the cornice. Provision shall be made for electrical wiring through vertical and horizontal members. Partitions shall be so constructed as to be readily disassembled entirely or in part for relocation. Gages of steel specified are manufacturer's standard and are the minimum acceptable. Ceiling braces shall be provided at intervals not exceeding 17 feet on partition runs by extending the structural part or equivalent member to the overhead construction. Except for glazing beads, fastenings shall be concealed by use of springclip or snap-on devices.

c. Materials:

(1) Aluminum Alloy Extrusions: Federal Specification QQ-A-357.

(2) Enamel: Federal Specification TT-E-491, Class A or B.

(3) Fastenings, Bolt and Anchor: Federal Specification FF-B-571.

(4) Insulating Fill: Federal Specification HH-I-521, Type I, II, or III.

(5) Primer: Federal Specification TT-P-659, class A and class B.

(6) Steel: Federal Specification QQ-S-636, exposed sheet steel shall be stretcher-leveled, cold-rolled, commercial-quality steel, with smooth clean surfaces.

d. Materials List: As soon as practicable and before installation of any materials, the contractor shall submit to the contracting officer a complete list, in triplicate, of materials and equipment to be incorporated in the work. This list shall include catalog numbers, cuts, and such other descriptive data as may be required. No consideration will be given to partial lists submitted from time to time. Approval of materials will be based on the manufacturer's published data subject to admission of complete shop drawings indicating compliance with the contract documents.

e. Shop Drawings: Shop drawings shall be submitted to the Contracting Officer. The shop drawings shall indicate partition arrangement in plan and elevation and shall show complete details of construction including gages of metal, anchors, fastenings, local conditions, and special fittings and accessories.

f. Construction: The fabrication of movable partitions of the type indicated shall be in accordance with the following specifications:

(1) Type A Partitions - insulated flush or semiflush metal panel units with standard metal parts shall be not less than 2-3/4 inches thick and not less than height indicated (full ceiling height). The partition parts or pilasters, relative to panel faces, shall be flush or offset not more than 1/8 inch. Component parts of partition shall conform to the following requirements:

(a) Panels shall be constructed of two steel sheets not lighter than 20 gage, secured to a steel frame by spot welding, crimping, concealed bolting, or other approved method that will assure a rigid and satisfying fastening around the perimeter of the sheets. The sheets shall be reinforced intermediately with especially shaped stiffeners of steel not lighter than 24 gage, spaced not over 12 inches on centers vertically, and spot welded to the sheet on 3-inch centers. The space between the steel sheets shall be filled with an insulating sound-deadening material that will give the panel unit a sound-transmission loss of not less than 36 decibels at a frequency of 512 cycles. The insulating material shall be mineral wool, fibrous glass, or other

comparable, approved, noncombustible material. Panel units, or manufacturer's standard construction reinforced by methods other than by the stiffeners specified above, may be used if approved in writing. Glazed openings of the size and location indicated shall be provided. Glass shall be bedded on felt or other especially prepared fabric, on plastic strips, or in a plastic glazing compound, and shall be secured by metal glazing beads neatly coped or mitered at corners and secured with oval-head screws or concealed clip fasteners. Telescopic-type glazing method for partitions may be employed with written approval. Glass and glazing shall be in conformance with section GLASS AND GLAZING.

(b) Posts shall be formed shapes constructed of sheet steel not lighter than 18 gage, punched for tie bolts, slotted for clip connections, or provided with a snap-on device for attachment of the panel units in any of four directions. Convenient access to electrical wiring shall be provided.

(c) Post Covers shall be formed of sheet steel not lighter than 20 gage, with exposed surface flush. Posts may be relieved with slight V-shaped lines or offset lines, and shall be flush with or offset from the panel not more than 1/8 inch. Caps and pilasters shall be the snap-on type, and shall be readily removable for access to electrical wiring.

(d) Base shall be not less than 4 inches high with a projection of approximately 1/4 inch and shall be formed of sheet steel not lighter than 18 gage. Base shall be provided on both sides of partitions, shall be adjustable to normal floor irregularities, and shall be readily removable in unit lengths to afford access to lay-in electrical wiring.

(e) Plinths, where required, shall be formed of sheet steel not lighter than 18 gage and shall be adjustable vertically to the floor at the posts.

(f) Cornice shall be a simple cap or plain cornice, designed to run continuous over the top of panels. The cornice member shall form a lay-in-type wire raceway, accessible from both sides of the partition, and shall be of sheet steel not lighter than 18 gage. The cornice member shall be in lengths best suited to the installation and shall be jointed over reinforcing sleeves or strips. If the cornice is a manufacturer's standard double-shell design, the exterior faces of the cornice member shall be the gage best suited to the forming operations required, and shall be secured to the raceway core member by springclips or other concealed fastenings.

(g) End fillers, where required, shall consist of two steel sheets not lighter than 21 gage, secured to side members formed of 18 gage steel, and if wider than 24 inches, shall have horizontal stiffeners spaced and welded as specified for panels. End filler units shall be filled with insulating material as specified for the panel units. End filler units shall be made to fit snugly into an 18 gage steel wall-channel member anchored to wall, and shall be secured to the adjacent post by tie bolts, clips, or other fastening devices in a manner similar to that employed by the manufacturer for the fastening of wall and door-panel sections to posts.

(h) Doorframes shall be formed of sheet steel not lighter than 18 gage, shall be rabbeted for doors, and reinforced at hinger, closer, and lock points with 11-gage steel plate welded in place. Unless otherwise shown or specified, the doorframes shall be drilled and tapped for the template hardware specified. Cutouts for strike plates shall be provided with dustboxes of sheet steel welded to the back of the frame. Doorframes shall be fitted with an approved continuous synthetic-rubber cushion strip on jambs and head attached in a manner that will permit easy removal for replacement. Partition units containing doors shall be adjustable vertically and shall be capable of assembly on floors having the normal deviations from a plane surface, without cutting the doors. Doorway panels shall be insulated as specified for other partition panels.

(i) Doors shall be 1-3/4 inches thick and of the size indicated. Doors shall be hollow-metal flush type. Double doors shall be the same height and thickness as single doors, and unless otherwise indicated, shall be sized to fit approximately 5-foot-wide openings. Double doors shall be provided with astragals. Faces of doors shall be of 20-gage sheet steel, with stiles not lighter than 18 gage. Glazing beads and muntins shall be no lighter than 20 gage. Cutouts and sinkages for mortised hardware shall be reinforced with 11-gage steel, and shall be drilled and tapped for the application of template hardware. Clearance of doors at jambs and head shall be 3/32 inch. Doors shall be properly sound-deadened with insulation to produce a sound-transmission loss approximately equal to that specified for the panel units.

(j) Glass and glazing of movable partitions shall be in accordance with manufacturer's standard for the partition furnished.

g. Door hardware for metal partition doors shall be manufacturer's standard.

h. Finishes: Metal surfaces shall be factory finished and shall be clean and dry when finish is applied. All surfaces shall be given a baked on coat of enamel primer conforming to Federal Specification TT-P-659, and exposed surfaces shall be given a finish of synthetic baking enamel conforming to Federal Specification TT-E-491, class B. Finish shall be evenly applied and of uniform color. Unless otherwise indicated, the finish color shall be medium French gray. The base member shall be finished in a darker shade of the same color as the remainder of the partition.

i. Installation: The partitions and supporting end and top bracing members required shall be for assembly and erection in a neat and workmanlike manner with the least possible drilling and cutting of the floors, ceilings, walls, columns, and beams. Wall-channel members for anchoring the ends of partition runs to building panel walls shall be secured by approved means. The necessary fastening of corner and intermediate post extension struts to suspended ceiling constructions or overhead structural members shall likewise be by approved means. Fastenings into reinforced concrete, where required, shall be 3/16- or 7/32-inch machine screws set in sleeve-type expansion shields.

20 INSULATION:

a. Scope:

(1) Insulation shall be furnished for installation so as to insulate all parts of building from the outside. In addition to roof and wall insulation, the suspended ceiling will also be insulated.

(2) Vaporproof barrier of waterproof paper or felt shall be placed on warm side of all insulation.

b. Materials:

(1) Insulation materials shall have inherent qualities as follows: vapor and moisture resistant; toxic to vermin, fungusproof and proof against other destroying organisms. Insulation shall be non-volatile, odorless and shall be a permanent product. It shall be fireproof and of low conductivity. U-value shall lie between 0.10 and 0.13 maximum.